CALIBRATION CHARTS
for
RADIO INTERFERENCE-FIELD INTENSITY MEASURING EQUIPMENT

NM-30A

Serial No. AD 158

STODDART
ELECTRO SYSTEMS
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For use with NM-30A , Serial # AD 158

NM-30A CHART SET

The word "signal" is used to designate any RF input to the equipment, i.e., sine wave, random interference or impulsive interference. Signal inputs to the equipment are of two types. The first includes the use of the equipment as a two-terminal voltmeter in making conducted measurements, by direct connection of the 20-foot RF input line to a 50-ohm coaxial circuit. Conductive measurements on lines carrying AC or DC voltages up to 1000 volts peak may be made. If impedances other than 50 ohms are connected to the input, the meter readings will be relative, not actual values.

The second type input is as a field intensity meter using dipole, rod or loop antennas as calibrated pickup devices. Field intensity measurements are made with antenna rotated for maximum response in the plane of polarization desired. Adjust antenna length within $\pm 1/8$" of calibration on frequency measuring tape for most accurate results. (See chart # 3.)

The information presented in this Chart Set is only valid when measurements are taken using the 20-foot RF transmission line. On conductive measurements it is assumed that the device being tested presents a carefully matched 50-ohm input to the equipment.

ADJUSTING EQUIPMENT FOR STANDARD GAIN

1. Set BAND switch (G) and TUNE dial (H) to desired frequency.
2. PULL attenuator knob (A) out, TURN to CAL position, PUSH all the way in.
3. Rotate FUNCTION switch (B) to CAL.
4. Rotate PEAK MODE switch to MANUAL.
5. Rotate PEAK control (C) to obtain approximate full peak meter reading.
6. Rotate CAL control (D) maximum counterclockwise.
7. Rotate PEAK control (C) for an output meter indication equal to the CALIBRATION SETTING for the desired frequency as provided on Charts #1 and #2. When measuring impulsive interference use a CALIBRATION SETTING of 25.75 db throughout the frequency range.
8. Adjust CAL control (D) clockwise until PEAK indicator lamp blinks in step with calibrator pulses, then adjust counterclockwise until lamp just ceases to light.
9. The equipment is now adjusted for standard gain. The CAL control (D) setting should not be changed until the RI-FI Meter is again standardized for gain at this or another frequency.

PEAK or "SLIDE BACK" OPERATION

1. PULL-TURN-PUSH attenuator knob (A) to CAL position.
2. Rotate function switch (B) to PEAK.
3. Rotate PEAK MODE switch to MANUAL.
4. Rotate PEAK control (C) to obtain approximate full scale meter reading.
5. PULL-TURN-PUSH attenuator knob (A) to appropriate step (X1 through $X10^4$).
6. Slowly adjust PEAK control (C) until interference just ceases to be visible on the lamp. Adjust attenuator as required. Adjust PEAK control carefully back and forth at the threshold point for improved accuracy. Take into account the slight lag in the effect of the control. The meter reads a bias (introduced by the PEAK control) which is identical to the peak value* of the signal.

*This equipment has been calibrated in terms of RMS of a sine wave (.707 of true peak of a sine wave). Peak values are therefore in terms of RMS of a sine wave which would have the same peak amplitude as the signal that appears at the second detector input.

MEASURING SINE WAVE SIGNALS

1. Standardize the gain of the equipment at the desired frequency.
2. Rotate FUNCTION switch (B) to FI for an RMS reading of C-W signals or to QP or PEAK when carrier plus modulation is to be measured.
3. PULL-TURN-PUSH attenuator knob (A) to select appropriate attenuation for meter reading in upper portion of the scale, where possible.
4. Multiply meter reading in microvolts by approprate correction factor from Chart #1 and #2. Where a pickup device is used multiply the corrected meter reading by appropriate antenna factor from Charts #4 and #5. Multiply the result by attenuator setting to obtain final corrected values.
5. When a sine wave signal is being measured in the FI function in the presence of high ambient interference of random nature, it is possible to correct for the interference and determine the actual value of the signal as though interference were not present. Refer to Chart #8. Also refer to NOISE PLUS SIGNAL CHART, section 4 of the instruction book.

MEASURING RANDOM INTERFERENCE

1. Standardize the gain of the equipment at the desired frequency.
2. Rotate FUNCTION switch (B) to FI for an EQUIVALENT RMS reading of random interference to QP for a "nuisance" value reading and to PEAK for a peak value* reading.
3. PULL-TURN-PUSH attenuator knob (A) to select appropriate attenuation for meter reading in upper portion of the scale, where possible.
4. Multiply meter reading in microvolts by appropriate correction factor from Chart #1 and #2. Where a pickup device is used, multiply the corrected meter reading by appropriate antenna factor from Charts #4 and #5. Multiply the result by attenuator setting to obtain final corrected values.
5. To obtain per-kilocycle values divide corrected values from Step 4 by the square root of the random interference bandwidth. Refer to Charts #6 and #7 for bandwidth data. The square root can be read directly at the top of Chart #9.

MEASURING IMPULSIVE INTERFERENCE

1. Standardize the gain of the equipment at the desired frequency.
2. Rotate function switch to PEAK position.
3. Rotate PEAK MODE switch to MANUAL.
4. PULL-TURN-PUSH Attenuator knob (A) to appropriate step (X1 through $X10^4$).
5. Slowly adjust PEAK control (C) until interference just ceases to be visible on the lamp or heard in the headphones. Adjust attenuator as required. Adjust PEAK control carefully back and forth at the threshold point for improved accuracy.
6. For conductive measurements multiply the meter reading in microvolts by the attenuator setting and divide by 100 to obtain final peak value* in microvolts-per-kilocycle.
7. Where a pick-up device is used, multiply the meter reading in microvolts by the attenuator setting and by the appropriate antenna factor from Charts #4 and #5. Divide the result by 100 to obtain final peak values* in microvolts-per-meter-per-kilocycle.
8. If greater accuracy is desired, RF cable losses must be taken into account. Multiply the final values of step 5 and 6 by the appropriate correction factor from Chart #9 to obtain final corrected values.

*This equipment has been calibrated in terms of RMS of a sine wave (.707 of true peak of sine wave). Peak values are therefore in terms of RMS of a sine wave which would have the same peak amplitude as the signal that appears at the second detector input.

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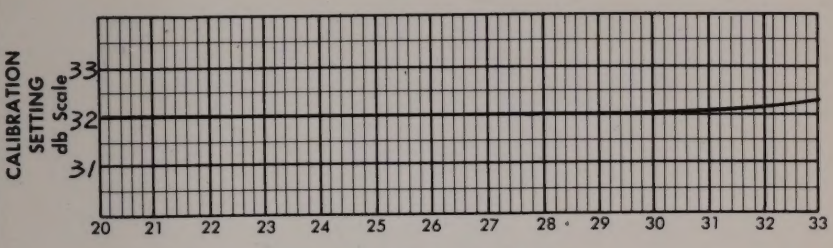
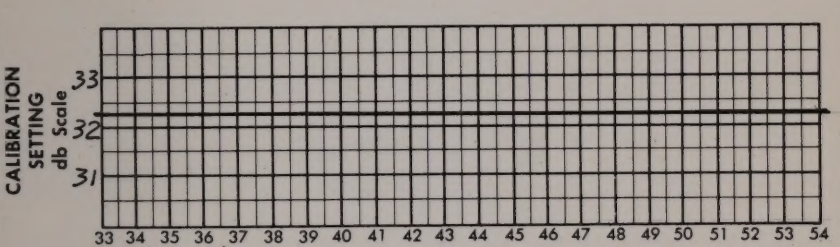
For use with NM-30A, Serial # AD158

CALIBRATION SETTINGS

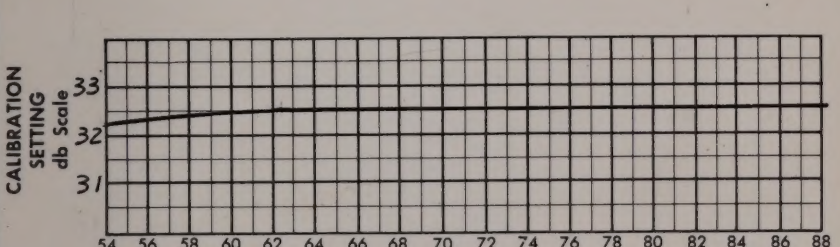
1. Enter the chart from the bottom at the frequency of the signal being observed. Follow up to intersect the plotted curve.
2. From the point of intersection follow to the left to find the calibration setting to be used.
3. Multiply the final meter reading by the correction factor to obtain reading in microvolts.



BAND 1 USE CORRECTION FACTOR OF 1.



BAND 2 USE CORRECTION FACTOR OF 1.



BAND 3 USE CORRECTION FACTOR OF 1.

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CHART 1

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https://archive.org/details/calibrationchart00unse_1

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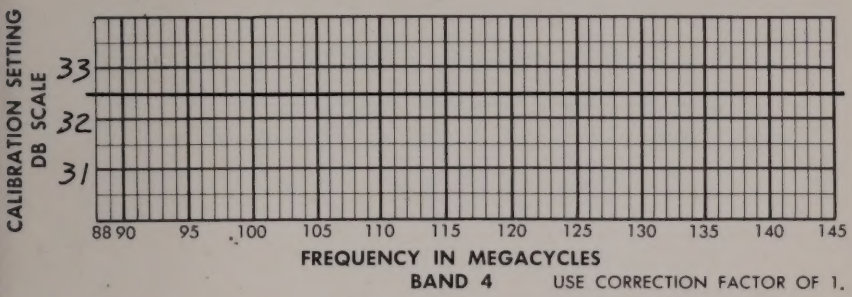
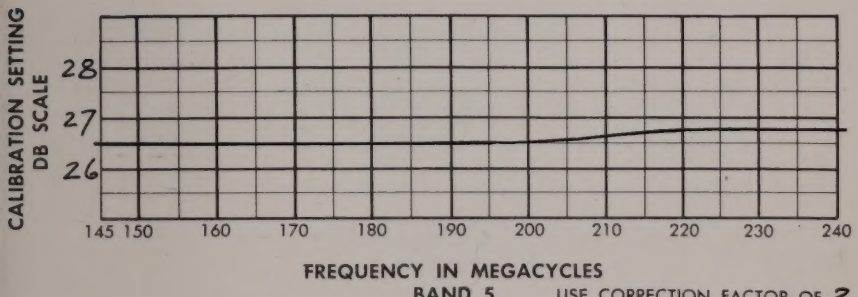
CALIBRATION SETTINGS

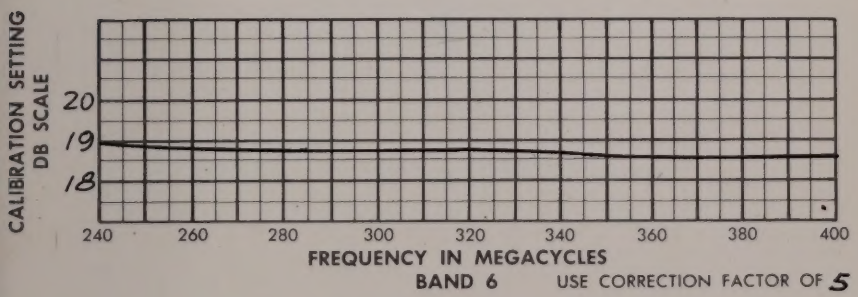
1. Enter the chart from the bottom at the frequency of the signal being observed. Follow up to intersect the plotted curve.
2. From the point of intersection follow to the left to find the CALIBRATION SETTING.
3. Multiply the final meter reading by the correction factor to obtain reading in microvolts.



BAND 4 USE CORRECTION FACTOR OF 1.



BAND 5 USE CORRECTION FACTOR OF 2



BAND 6 USE CORRECTION FACTOR OF 5

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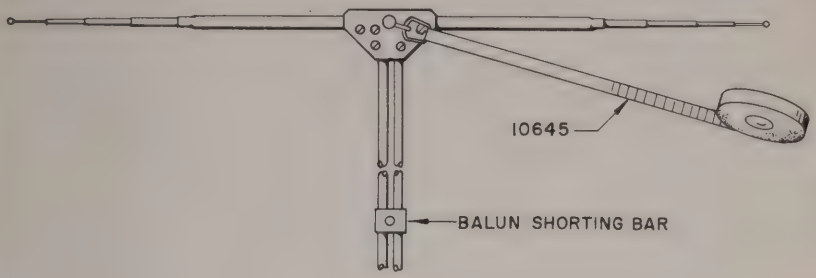
CHART 2

ANTENNA ADJUSTMENT DATA

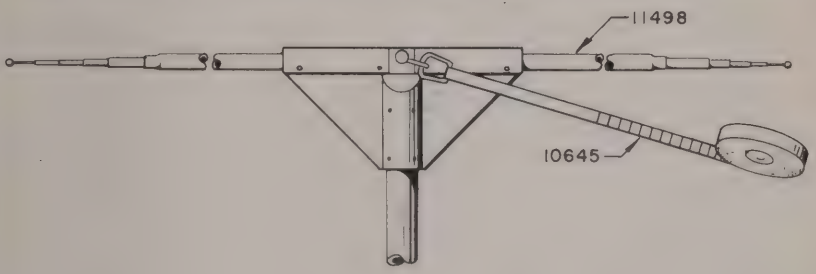
1. HIGH FREQUENCY DIPOLE; 91870-2 (88-400 mc)

Attach Measuring Tape 10645 to hook at the top of antenna and adjust antenna elements and upper edge of balun shorting bar to the operating frequency as indexed on measuring tape.



2. LOW FREQUENCY DIPOLE; 91865-2 (20-88 mc)

Insert one Telescoping Element 11498 into each side of the low frequency dipole head. Tighten thumbscrews securely. Attach Measuring Tape 10645 to hook at the top of antenna and adjust elements to the operating frequency as indexed on the measuring tape. This antenna employs a broadband balun and no balun shorting bar adjustment is necessary.



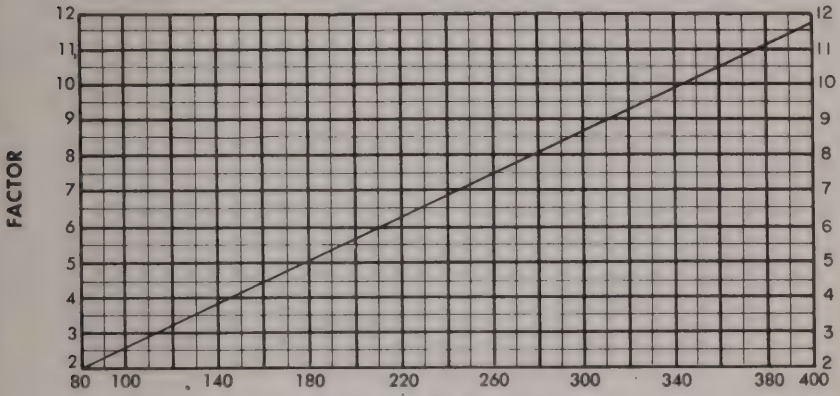
3. VERTICAL ANTENNA; Antenna Base 91972-4 (20-400 mc)

The vertical antenna is considered as one-half of a dipole. Use Antenna Element 11503 (normally attached to antenna base) for frequency range 88 to 400 mc and Telescoping Element 11498 (one of low frequency dipole elements) for frequency 20 to 88 mc. Adjust vertical element to operating frequency with the aid of Measuring Tape 10645. Vertical antenna factors shown on chart =5 are based on the use of a ground-plane attached to the antenna base consisting of 24 copper wires 160 inches long radiating evenly about the center.

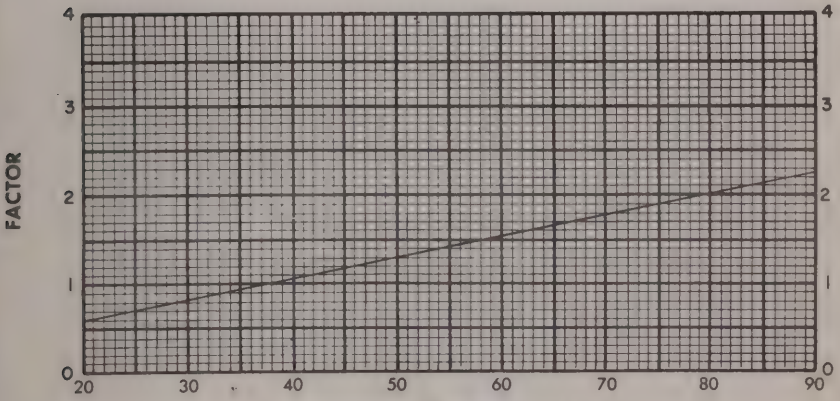
ANTENNA CORRECTION FACTORS

AS A FIELD INTENSITY METER USING TUNED DIPOLE ANTENNAS AND 90933-1 (20') R. F. TRANSMISSION LINE

1. Enter chart from the bottom at the frequency of the signal being observed. Follow upward to intersect the plotted curve.
2. From the point of intersection, follow to the left to find the correction factor.
3. Multiply the meter reading by this factor, by the correction factor from Chart #1 and #2, and by the attenuator setting to obtain corrected reading in microvolts-per-meter. High frequency dipole factors are based on a horizontal antenna at a height of 8½ feet above ground.



HIGH FREQUENCY DIPOLE (91870-2)



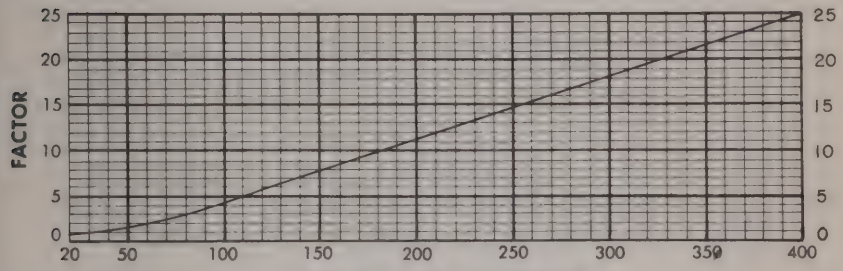
LOW FREQUENCY DIPOLE (91865-2)

Low frequency dipole factors are based on a horizontal antenna at a height of 10 feet above ground.

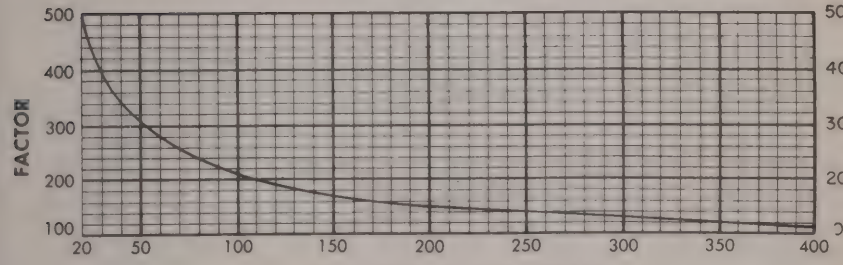
ANTENNA CORRECTION FACTORS

AS A FIELD INTENSITY METER USING THE FOLLOWING ANTENNAS AND A 90933-1 (20') R. F. TRANSMISSION LINE

1. Enter appropriate chart from the bottom at the frequency of the signal being observed. Follow upward to intersect the plotted curve.
2. From the point of intersection, follow to the left to find the correction factor.
3. Multiply the meter reading by this factor, by the correction factor from Charts #1 and #2 and by the attenuator setting to obtain corrected reading in microvolts-per-meter.



FREQUENCY IN MEGACYCLES
VERTICAL ANTENNA (See chart 3, par 3)



FREQUENCY IN MEGACYCLES
LOOP ANTENNA

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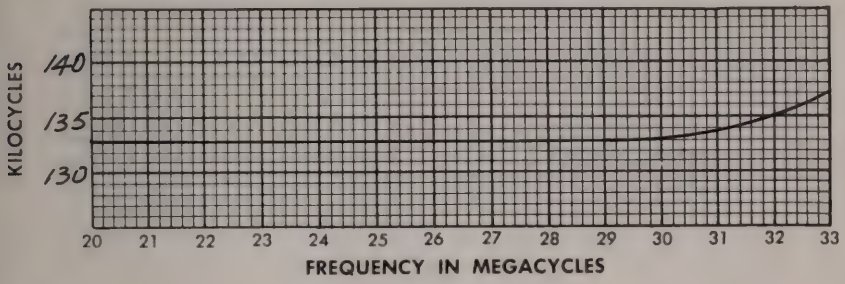
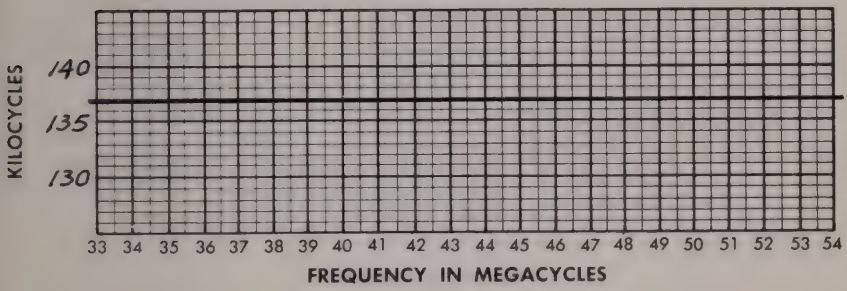
BANDWIDTH DATA

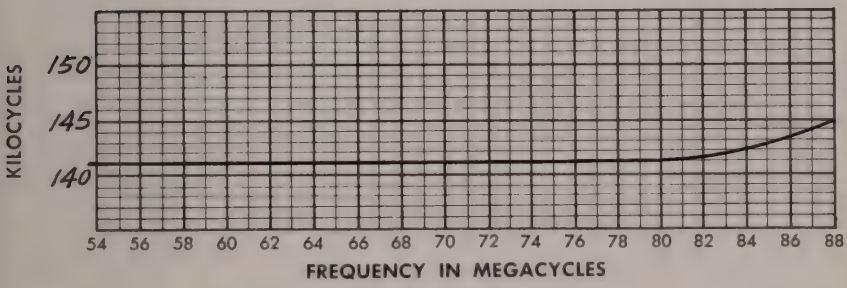
1. Enter the chart from the bottom at the frequency of the signal being observed. Follow upward to intersect the plotted curve.
2. From the point of intersection, follow to the left to find the Random Interference bandwidth.
3. The Impulse bandwidth can be determined by multiplying the Random Interference bandwidth by a factor of 1.5.
4. The 6 db bandwidth can be determined by multiplying the Random Interference bandwidth by a factor of 1.35.



BAND 1



BAND 2



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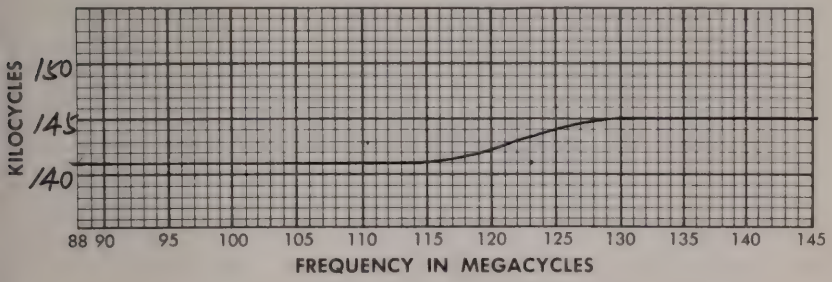
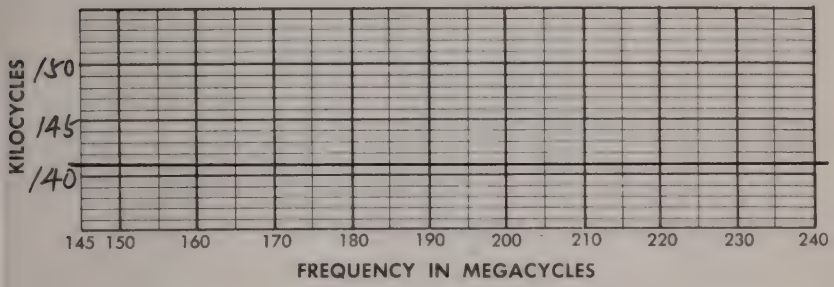
BANDWIDTH DATA

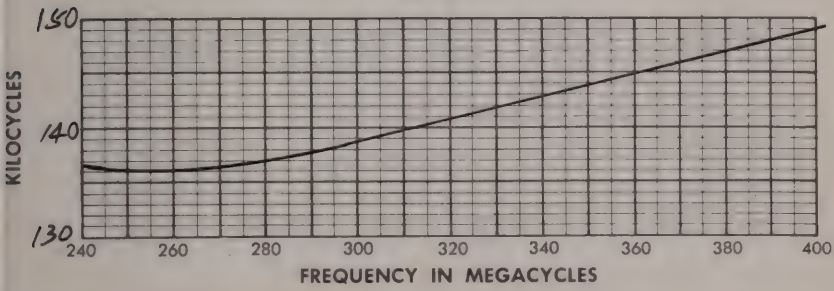
1. Enter the chart from the bottom at the frequency of the signal being observed. Follow upward to intersect the plotted curve.
2. From the point of intersection, follow to the left to find the Random Interference bandwidth.
3. The Impulse bandwidth can be determined by multiplying the Random Interference bandwidth by a factor of 1.5.
4. The 6 db bandwidth can be determined by multiplying the Random Interference bandwidth by a factor of 1.35.



BAND 4



BAND 5



BAND 6

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CHART 7

CORRECTION CHART FOR SINE WAVE SIGNALS IN THE PRESENCE OF HIGH AMBIENT INTERFERENCE OF RANDOM NATURE

1. Adjust for standard gain at the frequency of the incoming "signal." Rotate FUNCTION switch to FIELD INTENSITY.
2. Note the meter reading of the random interference in the absence of sine wave signal. If necessary, detune slightly off signal.
3. Tune signal for maximum meter reading and note reading of signal and interference combined.
4. Locate the meter reading of "interference plus signal" on horizontal scale of chart.
5. Follow the arc upward until it intersects the horizontal line which represents the "interference only" meter reading.
6. Drop down from the point of intersection to the horizontal scale and read off the corrected meter reading.
7. This is the value of the sine wave signal in the absence of interference.

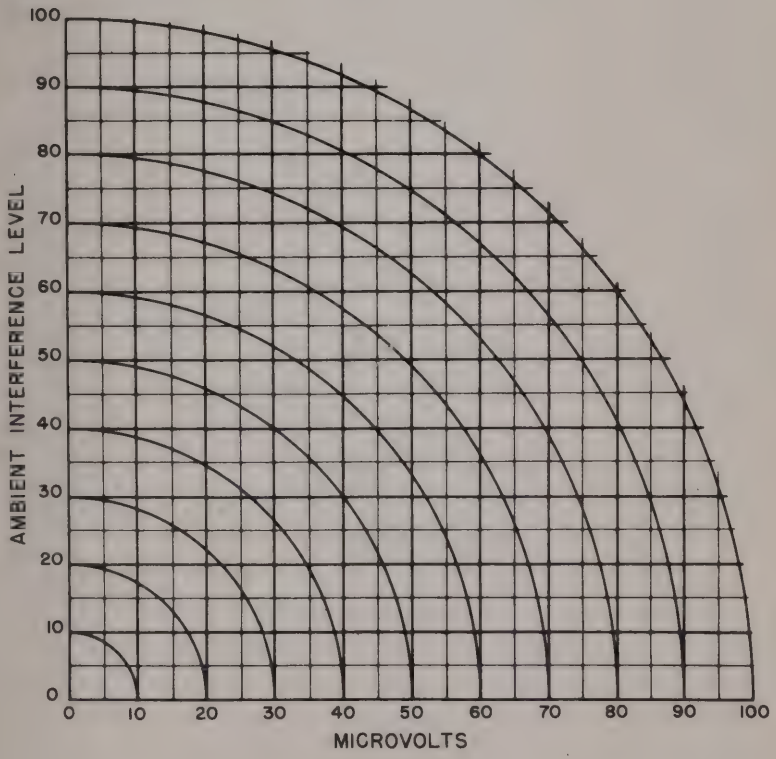

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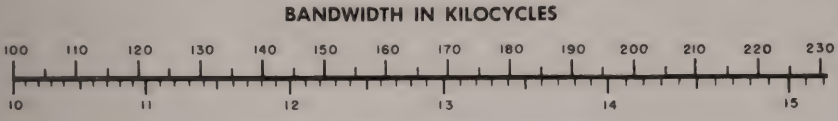
CHART 8

CHART FOR DETERMINING THE SQUARE ROOT OF THE BANDWIDTH

For use when converting microvolt readings of random interference to microvolt-per-kilocycle values.

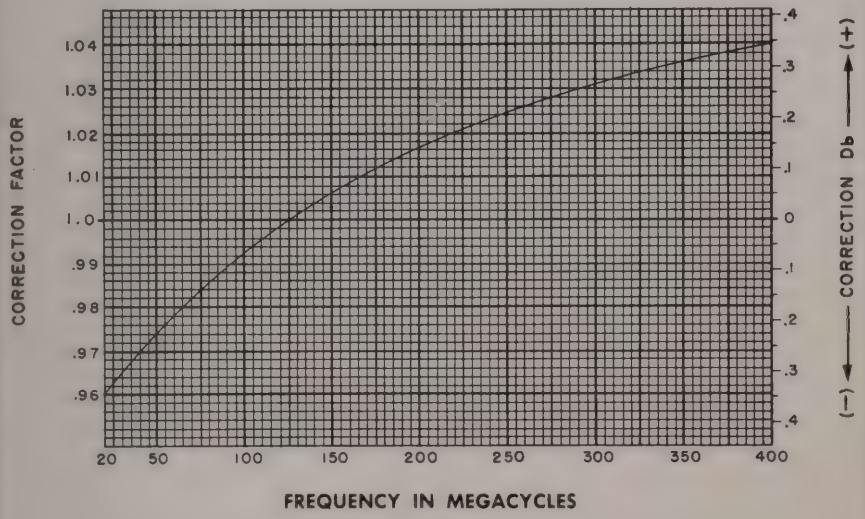
1. Refer to Charts #6 and #7 for the random interference *bandwidth*.
2. Locate the bandwidth value on upper scale of the chart.
3. The square root value of the bandwidth will be found directly below on the lower scale.



CORRECTION FACTORS WHEN MEASURING IMPULSIVE INTERFERENCE

For improved accuracy when measuring impulsive interference directly in terms of microvolts-per-kilocycle bandwidth. These factors compensate for the **90933-1 (20')** **RF CABLE** losses.

1. Enter the chart from the bottom at the frequency of the signal being observed. Follow upward to intersect the plotted curve.
2. From the point of intersection, follow to the left to find the correction factor.



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